Mesophotic Coral Ecosystems Research Strategy:

International Workshop to Prioritize Research and Management Needs for Mesophotic Coral Ecosystems

Jupiter, Florida • 12–15 July 2008

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Executive Summary

Mesophotic Coral Ecosystems Workshop
Jupiter, Florida — 12-15 July 2008

Overview

On July 12-15, 2008, researchers and resource managers met in Jupiter, Florida to discuss and review the state of knowledge regarding mesophotic coral ecosystems, develop a working definition for these ecosystems, identify critical resource management information needs, and develop a *Mesophotic Coral Ecosystems Research Strategy* to assist the U.S. National Oceanic and Atmospheric Administration (NOAA) and other agencies and institutions in their research prioritization and strategic planning for mesophotic coral ecosystems. Workshop participants included representatives from international, Federal, and state governments; academia; and nongovernmental organizations.

The Mesophotic Coral Ecosystems Workshop was hosted by the Perry Institute for Marine Science (PIMS) and organized by NOAA and the U.S. Geological Survey (USGS). The workshop goals, objectives, schedule, and products were governed by a Steering Committee consisting of members from NOAA (National Centers for Coastal Ocean Science's Center for Sponsored Coastal Ocean Research, the Office of Ocean Exploration and Research's NOAA Undersea Research Program, and the National Marine Fisheries Service), USGS, PIMS, the Caribbean Coral Reef Institute, and the Bishop Museum.

Mesophotic coral ecosystems are characterized by the presence of light-dependent corals and associated communities typically found at depths ranging from 30-40 m and extending to over 150 m in tropical and subtropical regions. The dominant communities providing structural habitat in the mesophotic zone can be comprised of coral, sponge, and algal species.

Accomplishments

The workshop resulted in three products: (1) a special issue of the peer-reviewed journal *Coral Reefs* reviewing the state of understanding of mesophotic coral ecosystems and the management needs associated with these ecosystems, as well as primary research articles focused on mesophotic coral ecosystems; (2) mesophotic.org, a online resource for scientists, resource managers, and others interested in the research, management, and conservation of mesophotic coral ecosystems; and (3) a *Mesophotic Coral Ecosystems Research Strategy* to help guide the path forward towards understanding these ecosystems.

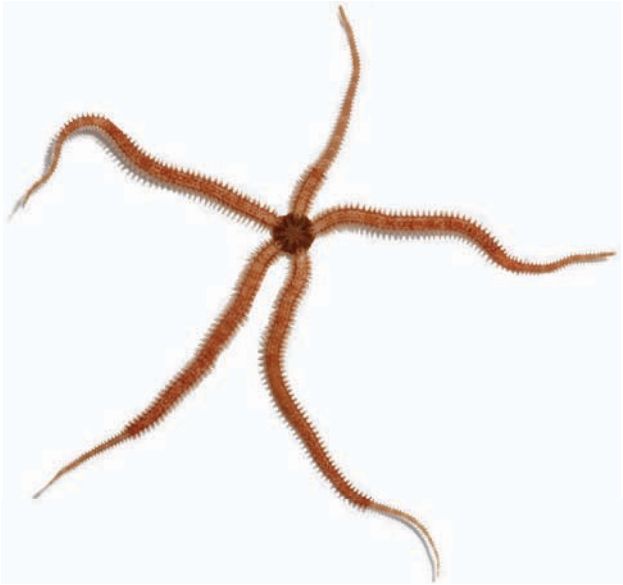
Research Priorities

Research priorities were identified to improve the understanding of mesophotic coral ecosystems to enable effective ecosystem-based management. Priorities were divided into three themes: characterization, ecology, and values and threats.

Characterization

Mesophotic coral ecosystems are far more extensive than previously thought with some experts estimating that their linear extent could rival or exceed that of shallower reefs. Suitable habitat for these ecosystems is dependent on several factors including light availability, substrate, temperature and other parameters. To what extent these factors control the distribution of these ecosystems is unknown.

The varied depths and topographies of mesophotic coral ecosystems present challenges for research sampling. Thus, there is a great disparity in the extent of knowledge for different taxonomic groups and geographic regions. Major components of the biotic assemblage are unknown, underscoring a critical need for basic taxonomic and systematic characterization.



Resource managers need to know where mesophotic coral ecosystems are found and their extent, what determines where these ecosystems are located, and what organisms are there.

Research priorities to address the needs are to:

» Determine the distribution and occurrence of these ecosystems, and the geological and physical processes that control their distribution.
» Characterize mesophotic coral ecosystem biodiversity and endemism.
» Understand the biotic and abiotic factors that influence and regulate biodiversity.

Ecology

Mesophotic coral ecosystems support an abundant reef fauna, some of which are shared with shallower coral ecosystems. However, many of the inhabitants of these ecosystems and the processes which regulate their community structure and dynamics are currently unknown. These ecosystems may be an extension of shallow coral biota, a unique assemblage, or a combination of shallow and deep biota. If there is connectivity between shallow and mesophotic coral ecosystems, then mesophotic coral ecosystems might be a potential source of propagules to restore depleted shallow populations.

Resource managers need to know what key species are present in these ecosystems, what ecological role these ecosystems play, and if they are connected to shallow, other mesophotic, and deep-sea coral ecosystems.

Research priorities to address the needs are to:

» Characterize community structure.
» Understand the specific processes and mechanisms that underlie the ecological dynamics of these ecosystems.
» Determine their ecological role.
» Understand the trophic, ecological, and genetic connectivity of mesophotic coral ecosystems with shallow, other mesophotic, and deep-sea coral ecosystems.

Values and Threats

Mesophotic coral ecosystems possess considerable natural, social, and economic values, and are believed to face similar threats as shallower coral ecosystems do. To protect the values of mesophotic coral ecosystems and mitigate the threats to them, we need to better understand, from an ecological and human dimension, how these systems are characterized, which factors control the processes that regulate them, and what the key values, threats, and impacts are.

Resource managers need to know what the threats and their subsequent impacts are to these ecosystems, as well as an improved understanding of their intrinsic and extrinsic values.

Research priorities to address the needs are to:

» Understand anthropogenic and natural impacts to these ecosystems.
» Determine the benefits of mesophotic coral ecosystems.

Workshop Accomplishments

- A special issue of *Coral Reefs* reviewing the state of knowledge regarding these ecosystems.
- Creation of mesophotic.org as a resource for individuals interested in mesophotic coral ecosystems and to enhance collaborations.
- A *Mesophotic Coral Ecosystem Research Strategy*.